C. Remarks

This Response is a submission under 37 CFR § 1.114 in connection with a Request for Continued Examination (RCE). Applicant and the undersigned wish to thank Examiner Evans for the courtesies extended during the telephonic interview conducted on January 17, 2007.

Interview Summary

On January 17, 2007 the undersigned conducted an Applicant-initiated interview with the Examiner. During the interview, U.S. Patent Nos. 5,137,364 and 6,534,794, as applied by the Examiner in support of the rejection of independent claims 1, 5, 9 and 21, were discussed. No agreement was reached, and the Examiner stated that any amended or newly presented claims would likely necessitate a new search.

Status of the Application

In the office action, the drawings were objected to under 37 CFR § 1.83(a) as failing to show every feature of the invention specified in the claims. Additionally, claims 1-11 and 21-25 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, and claims 3, 4, 7 and 8 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

With respect to the § 112 first paragraph rejection of claims 1-11 and 21-25, the Examiner required cancellation of alleged new matter from the claims and stated that

upon cancellation, the claim rejections set forth in the non-final office action dated March 22, 2006 would be re-instated. The rejections set forth in the non-final office action are as follows: claims 1-11, 21 and 23-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,137,364 (McCarthy I) in view of U.S. Patent No. 6,534,794 (Nakanishi), and claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over McCarthy I in view of Nakanishi and in further view of U.S. Patent No. 5,838,451 (McCarthy II).

Applicant respectively traverses the rejections set forth in the present office action, as well as the re-instated rejections set forth in the non-final office action, as follows.

35 U.S.C. § 112 First Paragraph Rejections

Without admitting the propriety or necessity of doing so, but rather for the purpose of expediting prosecution of the present application, Applicant has herein cancelled all references to the second substrate in claims 1 and 5, all references to the substrate to which the color measurement circuit is mounted in claim 9, and all references to the sensor substrate in claim 21. Applicant submits that the § 112 first paragraph rejection of claims 1-11 and 21-25 is thus rendered moot.

35 U.S.C. § 112 Second Paragraph Rejections

As noted above in connection with the § 112 first paragraph rejection, all references to the first substrate in claims 1 and 5 are herein cancelled. Applicant

submits that the § 112 second paragraph rejection of claims 3, 4, 7 and 8 is thus rendered moot.

37 CFR § 1.83(a) Drawing Objection

As noted above in connection with the § 112 first paragraph rejection, all references to the first substrate in claims 1 and 5 and all references to the sensor substrate in claim 21 are herein cancelled. Applicant submits that the § 1.83(a) objection to the drawings is thus rendered moot.

35 U.S.C. § 103(a) Rejections

Applicant has amended claim 1 to recite a color measurement instrument that includes:

> illuminator means for illuminating a sample, wherein said illuminator means defines an axis of illumination;
>
> color measurement means for measuring light reflected from said sample, wherein said color measurement means defines an axis of detection, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle;
>
> a temperature changing element for changing a temperature of said illuminator means;
>
> temperature sensing means for sensing the temperature of said illuminator means; and
>
> control means responsive to said temperature sensing means for controlling said temperature changing element such that the temperature of said illuminator means is maintained substantially equal to a target temperature that is greater than an operational ambient temperature range of the instrument.

Applicant submits that support for this amendment is found throughout the specification and figures as filed, such as, for example, at page 7, ln. 9 to page 8, ln 12, at page 12, ll. 12-15, and in FIG. 15. As noted above in connection with the § 112 first paragraph rejection, all references to the second substrate in claims 1 and 5, all references to the substrate to which the color measurement circuit is mounted in claim 9, and all references to the sensor substrate in claim 21 are herein cancelled.

With respect to the rejections set forth in non-final office action (which the Examiner indicated would be re-instated upon cancellation of the alleged new matter), Applicant submits that the Examiner has failed to meet the burden of establishing a *prima facie* case of obviousness. According to MPEP § 2143, three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). *See* MPEP 706.02(j).

As recited above, to form a *prima facie* case of obviousness under 35 U.S.C. § 103(a) the cited references, when combined, must teach or suggest every element of the claim. *See* MPEP § 2143.03, for example. For at least the reasons set forth below, Applicant respectfully submits that the Examiner has not established a

prima facie case of obviousness because McCarthy I and Nakanishi, taken alone or in combination, fail to teach or suggest every element recited in at least independent claims 1, 5, 9 and 21.

McCarthy I discloses a light measurement assembly including a set of emitters 2 (LED dice) and detectors 3. The emitters 2 are arranged around the circumference of the light measurement assembly, and the detectors 3 are centered thereon. *See* FIG. 1A and col. 4, ll. 18-35. The emitters 2 and detectors 3 are mounted on a common substrate 7 for providing a thermal connection therebetween. *See* FIG. 1A, col. 3, ll. 20-37, and col. 4, ll. 18-35. The light measurement assembly optionally includes a thermal sensing element 8 and a heating and cooling system 9. *See id.* The output of the thermal sensing element 8 is used to adjust linear transformations between weighted integrations and reported output units. *See id.* The heating and cooling system 9 functions to maintain the emitters 2 and the detectors 3 at a constant temperature during temperature stabilization. See col. 5, ll. 15-20. A fiber assembly for transmitting light from the emitters 2 to a sample 9 and for transmitting light reflected from the sample 9 to the detectors 3 is also disclosed. See FIGS. 2-4. As can be seen in FIG. 4, the ends of optical fibers 4 of the fiber assembly through which light is transmitted to and received from the target 9 are co-planar. Thus, the angle of illumination is equal to the angle of detection.

Nakanishi discloses a semi-conductor light-emitting unit 41A including a semi-conductor laser diode 1, a sub-mount 2, a mount 3, and a photodetector 6. *See* FIG. 1 and col. 5, ll. 58 - col. 6, ll. 2. The laser diode 1 is mounted to the sub-mount 2, which is in turn placed on a side face of the mount 3, and the photodetector 6 is placed on the

upper surface of the mount 3. *See id.* The unit 41A further includes a heating region 81 that is activated when the ambient temperature is lower than the temperature at which kinks are formed in the I-L characteristic (FIG. 12) of the laser diode 1. *See* col. 6, ll. 26-60. Heat transferred from the heating region 81 to the laser diode 1 allows the laser diode 1 to be operated within the linear (*i.e.*, "kink-free") region of its I-L characteristic.

First, Applicant submits that McCarthy I fails to disclose, among other things,

> illuminator means for illuminating a sample, wherein said illuminator means defines an axis of illumination; and
>
> color measurement means for measuring light reflected from said sample, wherein said color measurement means defines an axis of detection, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle,

as recited in claim 1. To the contrary and as noted above, McCarthy I clearly discloses that the emitters 2 and detectors 3 (the alleged "illuminator means" and "color measurement means," respectively) are mounted to a common planar substrate 7 in order to establish thermal communication therebetween. As a consequence of this mounting arrangement, the illumination and detection axes of the emitters 2 and detectors 3, respectively, are necessarily parallel and cannot intersect to form a non-zero angle as recited in claim 1. Furthermore, because the ends of optical fibers 4 of the fiber assembly are co-planar, as noted above, light is and transmitted to and received from the target 9 at the same angle. The design disclosed by McCarthy I thus appears limited to non-standard optical geometries and, unlike the arrangement of the present invention, cannot be used to create industry standard optical geometries, such as, for example, 45°/0° and diffuse sphere integrator geometries.

Nakanishi similarly fails to disclose the claimed orientation of the illuminator means and the color measurement means. In particular, Nakanishi fails to disclose that the illumination and detection axes of the laser diode 1 and the photodetector 6, respectively, intersect to form a non-zero angle, as the light-emitting face of the laser diode 1 and the light-receiving face of the photodetector 6 are co-planar. *See, e.g.*, FIGS. 1, 5, 8 and 9 and col. 6, ll. 18-25. As a result, the design disclosed by Nakanishi also appears limited to non-standard optical geometries.

Second, Applicant submits that McCarthy I also fails to disclose

> control means responsive to said temperature sensing means for controlling said temperature changing element such that the temperature of said illuminator means is maintained substantially equal to a target temperature that is greater than an operational ambient temperature range of the instrument,

as further recited in claim 1. The Examiner contends that the computer disclosed by McCarthy in FIG. 1 (the alleged "control means") is responsive to the thermal sensing element 8 (the alleged "temperature sensing means") for controlling the temperature changing means to control the temperature of the emitters 2 (the alleged "illuminator means"). Applicant respectfully disagrees. In particular, the output of the thermal sensing element 8 is not used by the computer to control substrate temperature, but rather is used to adjust linear transformations between weighted integrations and reported output units. *See* col. 3, ll. 29-33 and col. 6, ll. 10-17. In other words, the thermal sensing element 8 output is used by the computer to adjust photometric data, and not to control temperature.

Additionally, McCarthy I nowhere discloses that the computer functions to control the temperature of the emitters 2 "substantially equal to a target temperature that is

greater than an operational ambient temperature range of the instrument," as recited in claim 1. Although McCarthy discloses a temperature stabilization mode in which the emitters 2 and detectors 3 are maintained at a uniform temperature by a closed-loop heating/cooling system 9 (col. 5, ll. 15-20), McCarthy does not disclose any relationship between the temperature generated by the heating/cooling system 9 and an operational ambient temperature range of the light measurement assembly.

To further clarify the differences between the closed-loop heating/cooling system 9 of McCarthy I and the claimed "control means," Applicant directs the Examiner's attention to page 7, ln. 9 to page 8, ln. 2 of the specification as filed in which three options for controlling LED temperature are discussed. The first option is to heat the LEDs to a temperature above the operational ambient temperature range, the second option is to cool the LEDs to some point below the operational ambient temperature range, and the third option is to ignore the operational ambient temperature range altogether in favor of both heating and cooling. One of skill in the art would clearly understand the term "operational ambient temperature range" to refer to the range of ambient temperature over which the instrument is designed to operate.[1] As indicated at page 8, ll. 1-2 of the specification, only the first option of the three options is currently implemented by the described embodiments, and Applicant submits that it is only this option to which claims of the present application are directed.

Applicant now directs the Examiner's attention to page 8, ll. 3-12 of the specification as filed in which an example of the first option is presented. In particular, based on the operational ambient temperature range of the instrument (e.g., 0-40 °C),

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[1] The operational ambient temperature range is typically provided in the specification data sheet for the instrument. *See, e.g.*, page 2 of Appendix A.

the target temperature for the LEDs is selected to be above the operational ambient temperature range (45 °C, according to the example provided). The LED temperature may be maintained within 0.1 °C of the target temperature. McCarthy I nowhere discloses such a temperature control methodology. To the contrary, Applicant submits that one of skill in the art would readily appreciate that because the light measurement assembly of McCarthy I includes a closed-loop heating/cooling system 9, there is no need to heat the LEDs to a temperature above the operational ambient temperature range in order to avoid the effects of fluctuating ambient temperatures. Rather, the closed-loop heating/cooling system 9 is capable of maintaining a fixed LED temperature within the operational ambient temperature range irrespective of any ambient temperature changes. This is quite different than the heating-only embodiments discussed and claimed in the present application, wherein avoiding the effects of ambient temperature fluctuations within the operational ambient temperature range necessitates heating the LEDs to a temperature greater than the operational ambient temperature range.

Applicant further submits that Nakanishi similarly fails to disclose the claimed "control means." In particular, although Nakanishi discloses in FIG. 11 that a control circuit 103 controls a heating circuit 104 responsive to a temperature measuring circuit 102, the temperature control scheme employed by Nakanishi does not function to maintain the temperature of the laser diode 1 "substantially equal to a target temperature that is greater than an operational ambient temperature range of the instrument." Rather, Nakanishi discloses that the heating circuit 104 is energized only when the ambient temperature is such that kinks are formed in the low temperature I-L

characteristic (FIG. 12) of the laser diode 1. Accordingly, Nakanishi appears to permit the laser diode 1 temperature to fluctuate as long as the I-L characteristic remains sufficiently linear.

Third, Applicant agrees with the Examiner insofar as McCarthy I fails to disclose the "temperature changing element" feature recited in claim 1. The Examiner contends, however, that it would be obvious to one skilled in the art to modify McCarthy I to include the heating region 81 of Nakanishi. Even if McCarthy I could be modified in the manner proposed, Nakanishi still fails to remedy the above-described defects of McCarthy I with respect to claim 1.

For at least the above reasons, Applicant submits that claim 1, as well as claims 2-4 depending therefrom, are nonobvious over McCarthy I or Nakanishi, either alone or in combination. *See* MPEP §2143.03 (stating that if an independent claim is nonobvious under §103(a), then any claim depending therefrom is nonobvious).

Applicant has amended independent claims 5 and 9 in a manner analogous to that of claim 1. For the reasons set forth above, Applicant submits that claims 5 and 9, as well as claims 6-8 and 10-11 depending therefrom, respectively, are not rendered obvious by McCarthy I or Nakanishi, either along or in combination.

Applicant has amended independent claim 21 to recite a color measurement instrument that includes:

> a substrate;
>
> a temperature sensor in thermal communication with the substrate;
>
> a heating element in thermal communication with the substrate;

a temperature-sensitive illuminator in thermal communication with the substrate;

a temperature controller coupled to the temperature sensor and the heating element to maintain a temperature of the illuminator substantially equal to a target temperature that is greater than an operational ambient temperature range of the instrument; and

a light-sensing device.

For reasons analogous to those cited above in connection with the claimed "control means" recited in claim 1, Applicant submits that claim 21, as well as claims 22-25 depending therefrom, are not rendered obvious by McCarthy I or Nakanishi, either alone or in combination.

D. Conclusion

Applicant respectfully requests a Notice of Allowance for the pending claims in the present application. If the Examiner is of the opinion that the present application is in condition for disposition other than allowance, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below in order that the Examiner's concerns may be expeditiously addressed.

Respectfully submitted,

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Attorney for Applicant

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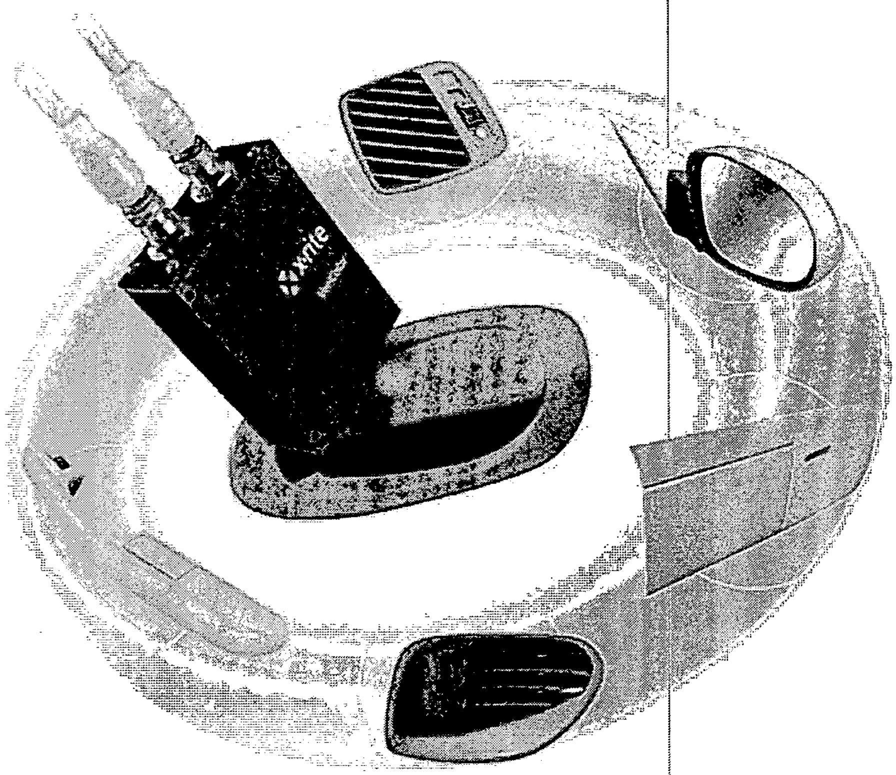
Appendix A

VeriColor™

Color Verification and Identification System



EXPERIENCE
the measurable color difference.™

(Available at http://www.xrite.com/product_overview.aspx?ID=598&Industry=4&Segment=6)

Product specifications

operational ambient temperature range

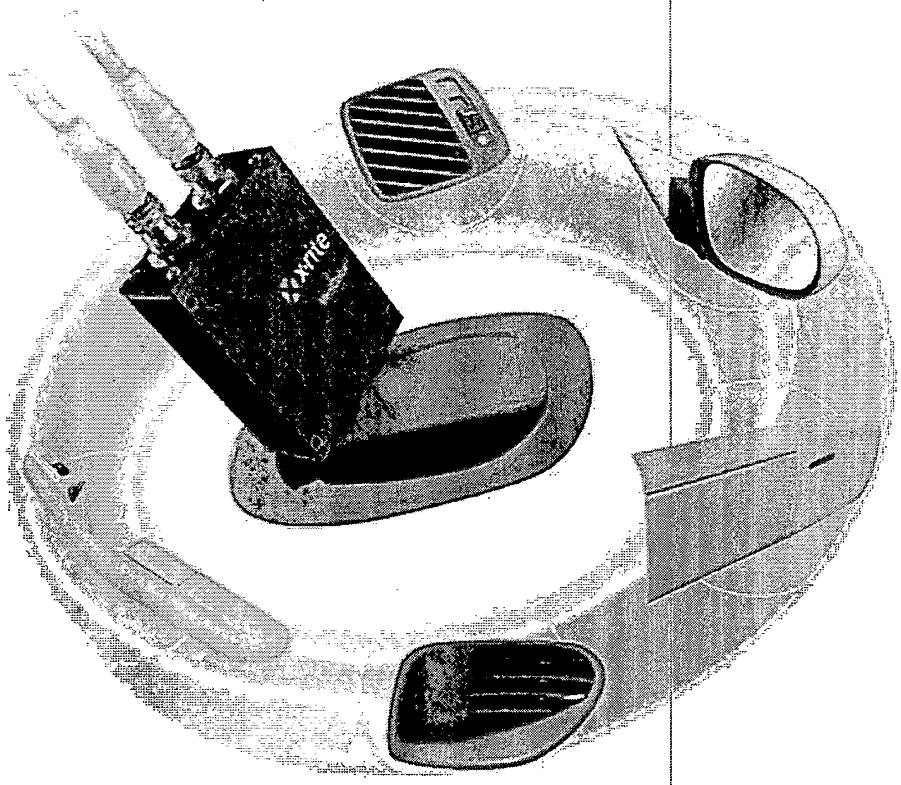
General Specifications	
Instrument Type	High resolution reflective color system
Geometry	0° / 30° or 30° / 0°
Measurement Area	12 or 6 mm spot sizes
Color Resolution	.25 ΔE*, typical
Illuminant Observer	N/A. Reports color differences in DLED (scaled similar to ΔE)
Operating Temperature Range	0 to 50°C (32 to 122°F)
Operating Humidity Range	0 - 95% non-condensing
Enclosure Specification	NEMA-12 / NEMA-4 or IP-67 (Hub / Head)
Hub Size	L: 6.9" (17.5 cm), W: 4.2" (10.7 cm), H: 3.2" (8.1 cm)
Hub Weight	24.6 oz (700 g)
Sensor Head Size	L: 5.1" (13 cm), W: 2.9" (7.4 cm), H: 1.3" (3.3 cm)
Sensor Head Weight	11.4 oz (325 g)
Power Source	18-30V AC or DC, 3 Amps Max. ($I_{typ} \leq 1$ amp)
Performance Specifications	
Repeatability — Black	.05% Reflectance (approx. = 0.3 ΔE) — 0 - 40°C (32 - 104°F)
Repeatability — White	.15% Reflectance (approx. = 0.1 ΔE) — 0 - 40°C (32 - 104°F)
Lamp Life	25+ years (@ 1 measure / sec. 24 x 7)
Calibration Time	Typically 90 days
Measurement Time	250 ms
Cycle Time	<1 sec. (time interval between measurements)
Measurement Distance	40 mm from sensor lens ± 5 mm positional insensitivity

*In color science, ΔE is a color difference in L*a*b* color space where the threshold of human perception is typically 1ΔE.

Appendix A

VeriColor™

Color Verification and Identification System



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